OCR
RECOGNISING ACHIEVEMENT

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
Advanced Subsidiary GCE

BIOLOGY 2802

Human Health and Disease

Monday **27 MAY 2002** Morning 1 hour

Candidates answer on the question paper.
Additional materials:
Electronic calculator

Candidate Name	Centre Number	Candidate Number

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers, in blue or black ink, in the spaces on the question paper.
- Read each question carefully before starting your answer.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is 60.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	12	
2	9	
3	11	
4	9	
5	9	
6	10	
TOTAL	60	

This question paper consists of 15 printed pages and 1 blank page.

Registered Charity Number: 1066969
[Turn over

For Examiner's Use

Answer **all** questions.

1 **(a)** List **five** components of a balanced diet.

1. .....

2. .....

3. .....

4. .....

5. .....[5]

The body mass index (BMI) is calculated using the following formula

$$\text{BMI} = \frac{\text{body mass in kg}}{(\text{height in metres})^2}$$

The BMI can be sub-divided into the categories shown in Table 1.1.

Table 1.1

BMI	category
below 20	underweight
20–25	acceptable
25–30	overweight
over 30	obese
over 40	very obese

A young woman has a body mass of 60 kg and is 1.6 metres tall.

(b) **(i)** Use the formula above to calculate her BMI. Express your answer to the nearest whole number.

.....[1]

(ii) Use Table 1.1 to identify this woman's category.

.....[1]

Obesity is on the increase in the UK.

An epidemiological study of some people born in the UK in March 1958 showed that fat children had the highest risk of becoming obese in adulthood. It also showed that most obese adults had not been fat in childhood or adolescence.

(c) List **three** degenerative diseases or conditions that obese people are at particular risk of developing.

1. .....

2. .....

3. .....[3]

(d) Suggest strategies that health authorities and groups such as *Weight Watchers* should adopt to reduce obesity in the UK.

.....

.....

.....

.....[2]

[Total : 12]

2 **(a)** Explain the term *aerobic exercise*.

.....

.....

.....[2]

A student investigated the effect of aerobic exercise on his father, using a cross country skiing machine and a digital pulse meter. He began by taking his father's resting pulse several times during the day and calculating a mean resting pulse rate.

The father completed five sessions on the skiing machine each at a different level of difficulty. The student recorded how long it took for his father's pulse to return to its resting value after each session. The investigation was repeated a second time and mean values calculated.

The results of this investigation are shown in Table 2.1.

Table 2.1

level of difficulty	mean maximum pulse rate/beats per minute	mean time taken to recover/min
1	133	4.0
2	143	5.5
3	174	10.0
4	184	12.0
5	187	12.5

(b) Explain why the student determined his father's mean resting pulse rate before the exercise began.

.....

.....

.....[1]

(c) Explain why it took several minutes for the father's pulse to return to its resting value after the exercise was finished.

.....

.....

.....

.....

.....[3]

(d) Explain how the student could extend the investigation to find out how much exercise on the skiing machine is necessary for his father to achieve a significant improvement in aerobic fitness.

.....

.....

.....

.....[3]

[Total : 9]

For Examiner's Use

3 Many people suffer from allergies that are unnecessary and exaggerated responses by their immune systems to allergens.

Allergens are harmless and do not cause disease.

Fig. 3.1 shows the stages in an allergic response to an allergen. (Not drawn to scale.)

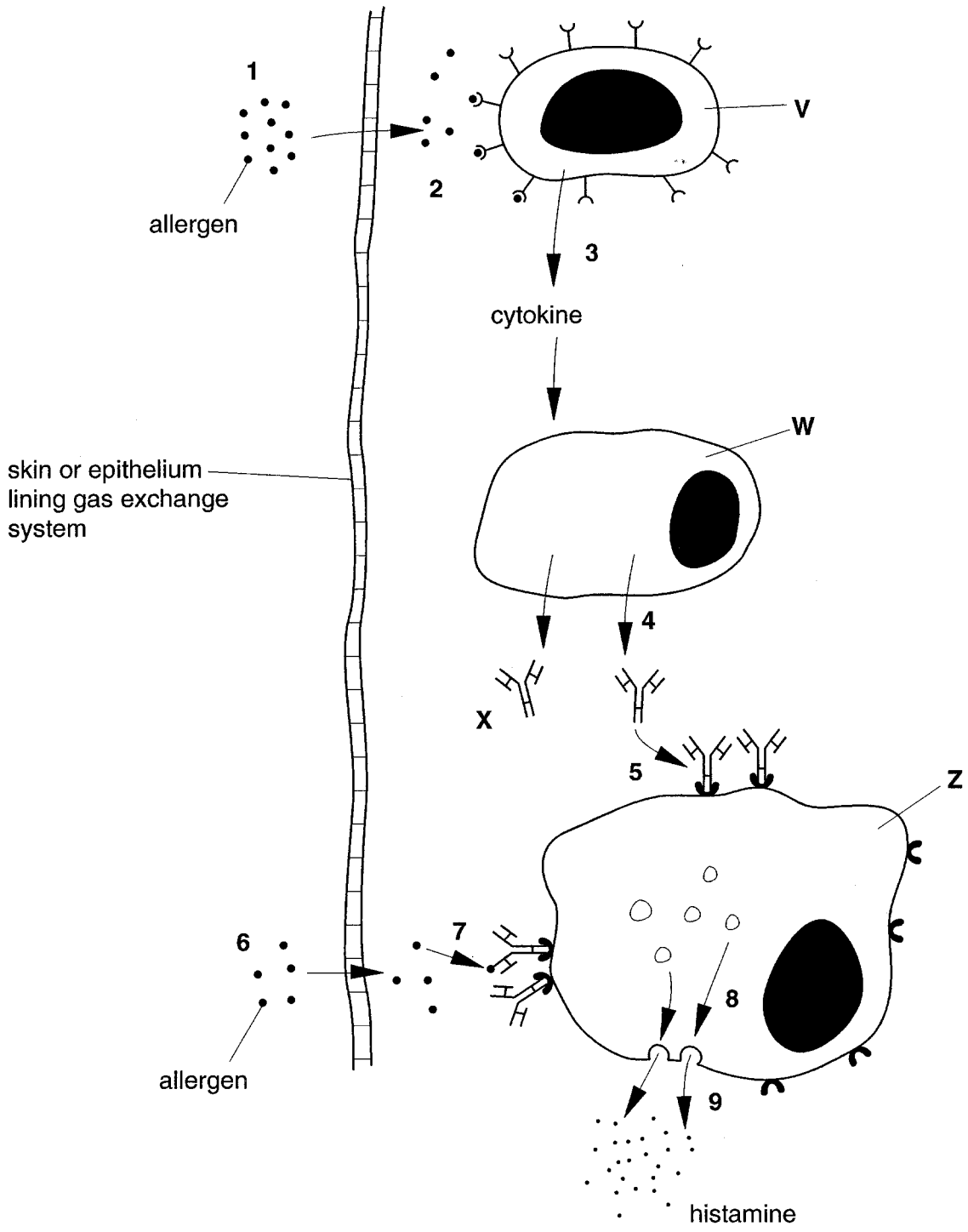

Fig. 3.1

For Examiner's Use

(a) Name **two** allergens.

.....[2]

(b) With reference to Fig. 3.1, name

(i) the cells labelled **V**, **W** and **Z**;

V .....

W .....

Z .....[3]

(ii) the molecule **X**.

.....[1]

(c) Explain how molecule **X** attaches to cell **Z**.

.....

.....

.....

.....[2]

When histamine is released during an asthmatic attack, it has a very severe effect on bronchioles.

(d) Describe the effect of histamine on bronchioles.

.....

.....

.....

.....

.....

.....[3]

[Total : 11]

[Turn over

4 The first draft of the human genome was announced on 26th June 2000. The first comprehensive overview and analysis of the human genome was published in the scientific journal *Nature* on 15th February 2001.

(a) Define the term *genome*.

.....

.....

.....[1]

The following statements have been made recently about the Human Genome Project.

> Genomics, the science of acquiring genome knowledge and determining what genes do, will dramatically influence healthcare as further research should lead to improvements in diagnosis, prevention and treatment.
>
> *BBC News Online*

> I am concerned that there are some who will want to use this new knowledge as a basis for discrimination.
>
> *Dr Craig Venter,*
> *Celera Genomics*

> Now we can look down the list of genes and see which one is causing the problem.
>
> *Professor John Burn,*
> *Newcastle University*

> The human genome will exist on the world's computers for as long as we exist.
>
> *Dr John Sulston,*
> *Sanger Centre, Cambridge*

> We need an international agreement that genetic information needs to be obtained by consent.
>
> *Dr Arthur Caplan,*
> *Bioethics Dept.,*
> *Pennsylvania University*

For Examiner's Use

(b) Outline the implications of the Human Genome Project for human health.

Credit will be given for answers that deal with a variety of issues rather than concentrating on just one. You may refer to the statements opposite in support of any points that you make.

(In this question, one mark is awarded for the quality of written communication.)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....[7]

QWC [1]

[Total: 9]

[Turn over

For Examiner's Use

5 All tourists to areas where cholera has occurred recently are recommended to

- drink only water that has been boiled or treated with chlorine or iodine;
- drink tea or coffee made with boiled water;
- drink carbonated or bottled drinks with no ice;
- eat only foods that have been cooked thoroughly and are still hot;
- avoid undercooked or raw fish or shellfish;
- eat only cooked vegetables;
- avoid eating salad vegetables;
- avoid foods and beverages from street vendors.

(a) Name the organism that causes cholera.

.....[1]

(b) Explain why tourists to areas where cholera has occurred recently are recommended to

(i) be careful about what they drink;

.....

.....

.....

.....

(ii) eat foods that have been cooked thoroughly.

.....

.....

.....

.....[4]

There have been epidemics of cholera in some parts of Africa for the last twenty years.

(c) State the meaning of the term *epidemic*.

.....[1]

(d) Explain why it has proved difficult to develop a vaccine to control the spread of cholera.

.....

.....

.....

.....

.....

.....[3]

[Total : 9]

BLANK PAGE

For Examiner's Use

6 Cigarette smoke contains tar, which is a mixture of many different chemicals. Some of these may stimulate changes to cells in the lining of the bronchi. These changes may lead to cancerous growths in the lung.

(a) **(i)** What name is given to chemicals that cause cancer?

.....[1]

(ii) Describe briefly the changes that occur **in the cells** lining the bronchi in response to these chemicals.

.....

.....

.....

.....

.....

.....

.....[3]

(b) State **two** symptoms of lung cancer.

.....

.....

.....

.....[2]

[Turn over

Studies have shown that some aspects of smoking behaviour increase the risk of developing lung cancer.

Fig. 6.1 shows the changes in the percentage of smokers in the male population of the UK between 1950 and 1998.

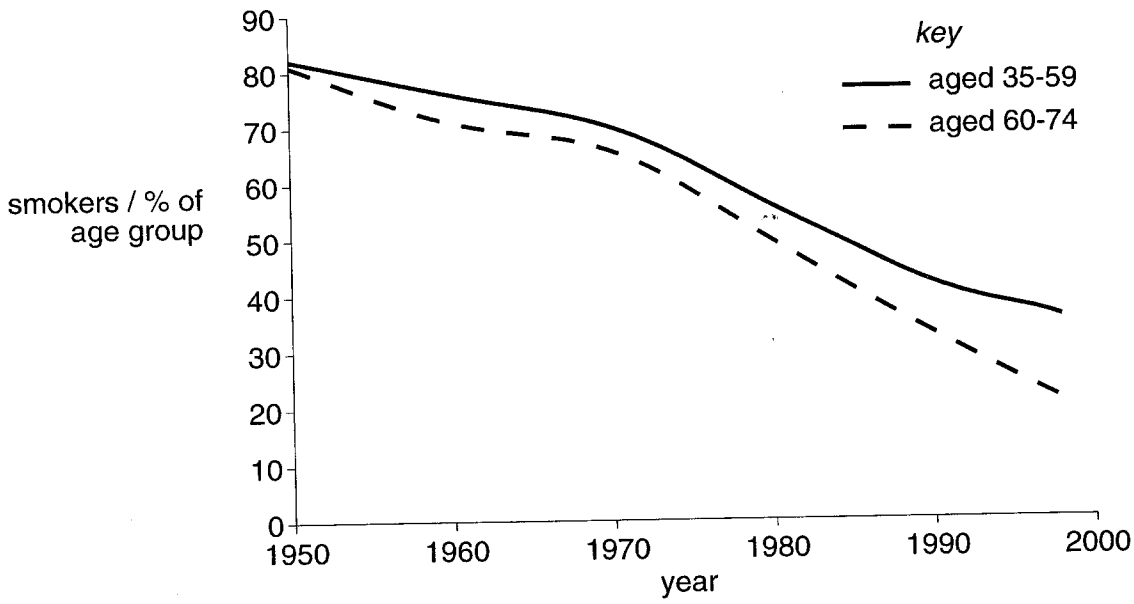

Fig. 6.1

Fig. 6.2 shows the changes in mortality from lung cancer in men over the same period of time.

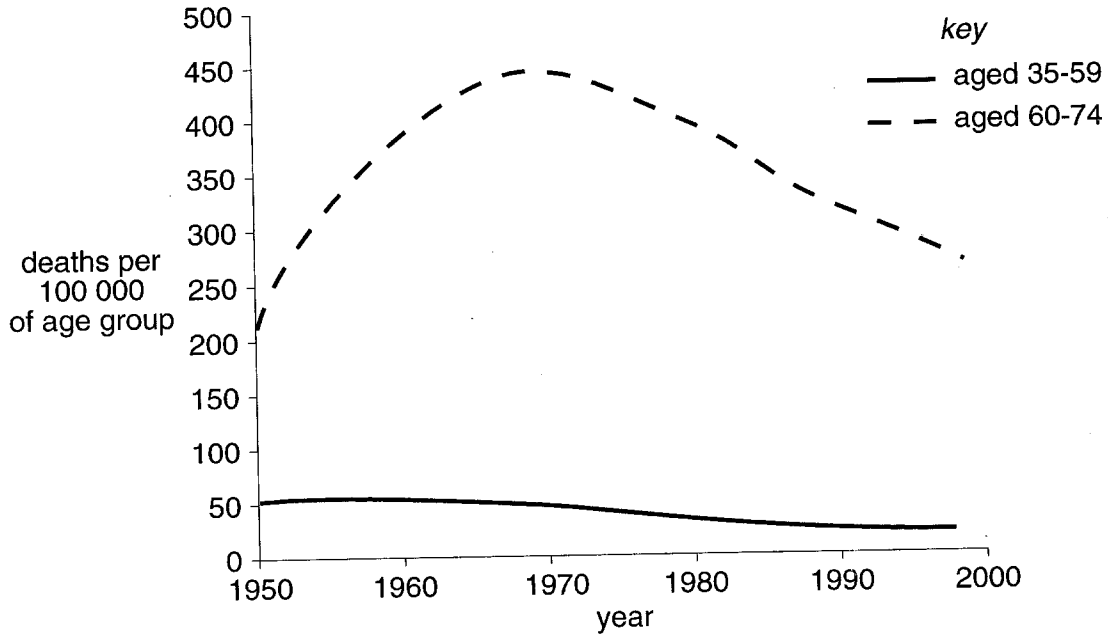

Fig. 6.2

For Examiner's Use

(c) Describe and explain the changes in mortality from lung cancer among men in the UK between 1950 and 1998. Use the information in Fig. 6.1 and Fig. 6.2 to help your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total : 10]